

Undergraduate Level

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Presentation Title: ROS Hexapod

Research focus: ROS software/coding implementation

School: Navajo Technical University (NTU)

Student level: Junior

Abstract:

ROS Hexapod

As an intern project for NASA Johnson Space Center (JSC), my job was to familiarize myself and operate a Robotics Operating System (ROS). The project outcome converted existing software assets into ROS using nodes, enabling a robotic Hexapod to communicate to be functional and controlled by an existing PlayStation 3 (PS3) controller. Existing control algorithms and current libraries have no ROS capabilities within the Hexapod C++ source code when the internship started, but that has changed throughout my internship. Conversion of C++ codes to ROS enabled existing code to be compatible with ROS, and is now controlled using an existing PS3 controller. Furthermore, my job description was to design ROS messages and script programs that enabled assets to participate in the ROS ecosystem by subscribing and publishing messages. Software programming source code is written in directories using C++. Testing of software assets included compiling code within the Linux environment using a terminal. The terminal ran the code from a directory. Several problems occurred while compiling code and the code would not compile. So modifying code to where C++ can read the source code were made. Once the code was compiled and ran, the code was uploaded to Hexapod and then controlled by a PS3 controller. The project outcome has the Hexapod fully functional and compatible with ROS and operates using the PlayStation 3 controller. In addition, an open source software (IDE) Arduino board will be integrated into the ecosystem with designing circuitry on a breadboard to add additional behavior with push buttons, potentiometers and other simple elements in the electrical circuitry. Other projects with the Arduino will be a GPS module, digital clock that will run off 22 satellites to show accurate real time using a GPS signal and an internal patch antenna to communicate with satellites. In addition, this internship experience has led me to pursue myself to learn coding more efficiently and effectively to write, subscribe and publish my own source code in different programming languages. With some familiarity with software programming, it will enhance my skills in the electrical engineering field. In contrast, my experience here at JSC with the Simulation and Graphics Branch (ER7) has led me to take my coding skill to be more proficient to increase my knowledge in software programming, and also enhancing my skills in ROS. This knowledge will be taken back to my university to implement coding in a school project that will use source coding and ROS to work on the PR2 robot which is controlled by ROS software. My skills learned here will be used to integrate messages to subscribe and publish ROS messages to a PR2 robot. The PR2 robot will be controlled by an existing PS3 controller by changing C++ coding to subscribe and publish messages to ROS. Overall the skills that were obtained here will not be lost, but increased.